EPIDEMIOLOGIC STUDIES OF *SALMONELLA* IN SWINE USING CULTURE AND ELISA

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Studies of *Salmonella* infections in pigs in the United States have relied almost entirely on bacteriologic culture methods. A serologic test has recently been described (Nielsen, Baggesen et al. 1995) for use as a herd monitoring test for *Salmonella*. This test (mix-ELISA) is an indirect ELISA that uses lipopolysaccharide (LPS) extracted from *S. typhimurium* (O 1, 4, 5, and 12) and *S. choleraesuis* (O 6, 7). The purpose of these studies was to determine if the mix-ELISA can be considered for use as a herd monitoring tool in the United States for the detection of herds infected with *Salmonella*. Two studies were conducted. In the first study, culture results from pig feces were compared with serologic results from serum for the prevalence of *Salmonella*. In the second study, culture results from mesenteric lymph nodes and muscle juice collected at the time of slaughter were compared for the prevalence of *Salmonella*.

MATERIALS AND METHODS

Study number one: Three commercial farms were selected for sampling during the same year for this study. One farm (Farm A) was visited for 10 months during the year, Farm B was visited monthly for the year, and Farm C was visited for 6 months during the year. At each visit, 30 samples of feces and blood were collected. Fresh fecal samples from the pen floor were collected for culture. Within that pen, one pig was bled. Fecal samples were pre-enriched in tetrathionate and GN-Hajna and further cultured as previously described (Fedorka-Cray, Harris et al. 1997). Serum samples were submitted to the Danish Veterinary Laboratory for mix-ELISA testing.

Study number two: The same three commercial farms and an additional farm submitted samples from swine carcasses for testing. Mesenteric lymph node and muscle were collected from each carcass during evisceration. Mesenteric lymph nodes macerated and cultured for *Salmonella* using the same methods as referenced above. Muscle samples were frozen and then thawed in order to collect muscle juice. Muscle juice was tested for the presence of *Salmonella* antibody as previously described (Nielsen, Baggesen et al. 1996).

RESULTS

Study number 1: All three herds had different culture prevalence over the course of sampling. Culture prevalence of Farm A was 0% for 7 months but increased in May and August (5%, 7%, respectively). The serotypes isolated were *S. enteritidis, S. derby*, and *S. thomasville*. Culture prevalence of Farm B was 0% for 9 months but increased in January, February, and December

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(10%, 4%, and 10%, respectively). The serotypes isolated were *S. derby* and *S. choleraesuis.* Culture prevalence for Farm C for the months of June, August, September, October, November and December were 7%, 7%, 2.5%, 5%, .9% and 8%, respectively. Serotypes isolated included *S. derby, S. heidelberg, S. anatum, S. typhimurium* var *Copenhagen, S. choleraesuis,* and *S. infantis.* All groups of pigs were classified according to culture prevalence and seroprevalence (Table 1). *Salmonella* level 1 groups have 10% or fewer seropositive samples per group. *Salmonella* level 2 groups of pigs have over 10% and less than or equal to 15% seropositive samples per group of pigs. *Salmonella* level 3 groups of pigs have over 15% seropositive samples per group of pigs. Chi-square was 4.72 (2 d.f., p=.094) for differences observed in distribution among the table cells.

Table 1. Comparison of culture prevalence and seroprevalence using the mix-ELISA.

	Number of Groups of Pigs at each *Salmonella* Level		
Culture Prevalence	**Level 1**	**Level 2**	**Level 3**
Negative	21	1	7
Positive	8	1	9
Total	29	2	16

Study number 2: Table 2 contains a summary of the mesenteric lymph node culture results and the seroprevalence results from mix-ELISA of muscle juice. *Salmonella* level was determined by the seroprevalence of *Salmonella* antibodies for each group of pigs. *Salmonella* level 1 pigs have less than or equal to 10% seroprevalence, *Salmonella* level 2 pigs have between 10 and 15% seroprevalence, and *Salmonella* level 3, over 15%. Chi-square was calculated as 11.12 (2 d.f. p=.004) for differences observed in the distribution among the table cells.

Table 2. Comparison of mesenteric lymph node culture prevalence and seroprevalence using the mix-ELISA.

	Number of Groups of Pigs at each *Salmonella* Level		
Culture Prevalence	**Level 1**	**Level 2**	**Level 3**
Negative	9	3	2
Positive	14	0	17
Total	23	3	19

CONCLUSIONS

These results suggest that there might be different *Salmonella* culture prevalence patterns for commercial farms in the United States. Further work is needed to determine if these differences are peculiar to certain serotypes or farm management practices. It was also demonstrated that the mix-ELISA is capable of detecting those groups of pigs with high culture prevalence of *Salmonella* in fecal samples as well as mesenteric lymph node samples.

Thus, the mix-ELISA could be used in the United States as a herd test for the detection of *Salmonella*-positive herds.

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